

SOUND VOLUME ADJUSTMENT SYSTEM IN PERSONAL COMPUTER AND
SOUND VOLUME ADJUSTMENT METHOD THEREOF

BACKGROUND OF THE INVENTION

5 FIELD OF THE INVENTION

The present invention relates to a sound volume adjustment system in a personal computer and, more particularly, to a sound volume adjustment system enabling voice data to be reproduced in a level sound volume appropriated for each application and a sound volume adjustment method thereof.

DESCRIPTION OF THE RELATED ART

10 First, one example of sound volume adjustment in a conventional personal computer will be described with reference to Fig. 3.

15 Fig. 3 is a functional block diagram for use in explaining an arrangement of sound volume adjustment in a conventional personal computer. In multi-task environments, for example, voice data is transferred from a plurality of applications 320 and 321 to an operating system (e.g. Windows 98 (Registered Trademark)) as illustrated in Fig. 3. Then, an operating system 300 reproduces the voice data by the sound function. A sound volume of the reproduced sound is adjusted by a volume adjustment function 310.

20 The sound function of a personal computer has not only a function of reproducing voice data from an

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application but also a function of generating a warning sound for use in notifying the occurrence of error etc. by an operating system.

5 In a conventional personal computer, however, a sound volume of a reproduced sound of voice data and a sound volume of a warning sound are adjusted in the lump by the common volume adjustment function (e.g. analog volume) 310. Change of the volume of the reproduced sound of voice data will therefore result in change of the sound volume of the warning sound as well.

10 As a result, in a conventional personal computer, when an error occurs while voice data from an application is reproduced with its sound volume increased, a large volume of warning sound will be generated. To the contrary, when an error occurs while voice data is reproduced with its volume decreased, a user might not notice the warning sound.

15 Under these circumstances, a technique of individually adjusting a sound volume of a warning sound (buzzer sound) and a volume of a reproduced sound of voice data is proposed in Japanese Patent Laid-Open Kokai No. (Heisei) 10-31578 (Literature 1). According to the art disclosed in Literature 1, separately provided in addition to an analog volume are a sound volume adjustment unit for adjusting a volume of a reproduced sound of voice data and a buzzer sound volume adjustment unit for adjusting a volume of a warning sound.

The above-described technique disclosed in Literature 1 has an advantage in realizing individual adjustment of a volume of a reproduced sound of voice data and a volume of a warning sound.

5 The conventional art, however, needs adjustment of the sound volume adjustment unit and the buzzer sound volume adjustment unit in addition to an analog volume, so that operation for sound volume adjustment might be complicated, which leaves a room for technical
10 improvement.

 In a multi-task environment, for example, voice data is transferred from a plurality of applications to an operating system as describe above. These voice data is ordinarily transferred as pulse coded modulation
15 (PCM) data. For such PCM data, a volume of its reproduced sound is roughly classified into two.

 That is, the first reproduced sound volume is a sound volume adjusted for a player as a domestic appliance. Among examples of volumes to be thus adjusted
20 are a sound volume of reproduced voice data of a CD (Compact Disk) and a sound volume of reproduced voice data of a DVD (Digital Video Disk).

 Second reproduced sound volume is that of voice data assumed to be handled as an application of a
25 personal computer. Sound volume in this case is adjusted to have the same level as that of a volume of a warning sound of the personal computer.

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Thus, even in a case where volumes of reproduced sounds of voice data from applications are adjusted in the lump independently of a volume of a warning sound, the volumes of the reproduced sounds might vary with applications, so that there might arise a need of adjusting a sound volume for each application.

SUMMARY OF THE INVENTION

The present invention, intended to solve the above problems, aims at providing a personal computer enabling voice data to be reproduced in a level sound volume appropriate for each application and requiring easy sound volume adjustment operation and a sound volume adjustment method thereof, and a recording medium which records a program for making the computer to execute the sound volume adjustment processing therefor.

According to the first aspect of the invention, a sound volume adjustment system for a personal computer, comprises

a memory in which sound volume setting information set for each application is registered, and sound volume adjustment control means for adjusting, for each application, sound volume data of voice data transferred from the application to an operating system based on the sound volume setting information to generate sound volume data having been adjusted and transferring the sound volume data having

been adjusted to the operating system.

Thus registering an application and sound volume setting information correlated to each other and automatically adjusting sound volume data based on the sound volume setting information eliminates the user's need of adjusting a sound volume for each application. The present invention therefore realizes a personal computer enabling voice data to be reproduced in a level sound volume appropriate for each application and requiring easy sound volume adjustment operation.

In the preferred construction, in the memory a sound volume adjustment coefficient is stored as the sound volume setting information, and the sound volume adjustment control means multiplies the sound volume data by the sound volume adjustment coefficient to generate the sound volume data having been adjusted.

Thus, by generating sound volume data having been adjusted by multiplying sound volume data by a sound volume adjustment coefficient, a sound volume can be adjusted with ease.

In another preferred construction, a sound volume level of the sound volume data having been adjusted is set to be equivalent to that of a sound volume of a system sound (error sound) generated by the operating system.

As described in the foregoing, adjusting the level of a sound volume of sound volume data having been

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adjusted to the level of a sound volume of an error sound allows a sound volume of a reproduced sound of voice data from an application to equal a sound volume of a warning sound. As a result, it is possible to prevent such a situation that a warning sound is too loud or too weak for a volume of a reproduced sound of voice data.

In another preferred construction, in the memory a sound volume adjustment coefficient is stored as the sound volume setting information, the sound volume adjustment control means multiplies the sound volume data by the sound volume adjustment coefficient to generate the sound volume data having been adjusted, and a sound volume level of the sound volume data having been adjusted is set to be equivalent to that of a sound volume of a system sound (error sound) generated by the operating system.

In another preferred construction, when voice data is transferred from an application for which sound volume setting information is yet to be registered, the sound volume adjustment control means displays sound volume adjustment function indications on an operation screen to register, in the memory, sound volume setting information based on a sound volume set by the operation through the sound volume adjustment function indications so as to correspond to the application.

By a manner as described in the foregoing, even

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a sound volume adjustment method for a personal computer,
comprising the steps of

registering sound volume setting information set
for each application,

5 adjusting, for each application, sound volume
data of voice data transferred from the application to
an operating system based on the sound volume setting
information to generate sound volume data having been
adjusted, and

10 transferring the sound volume data having been
adjusted to the operating system.

In the preferred construction, a sound volume
adjustment coefficient is registered as the sound volume
setting information, and the sound volume data is
15 multiplied by the sound volume adjustment coefficient to
generate the sound volume data having been adjusted.

In another preferred construction, a sound volume
level of the sound volume data having been adjusted is
set to be equivalent to that of a sound volume of a
20 system sound (error sound) generated by the operating
system.

In another preferred construction, a sound volume
adjustment coefficient is stored as the sound volume
setting information, the sound volume data is multiplied
25 by the sound volume adjustment coefficient to generate
the sound volume data having been adjusted, and a sound
volume level of the sound volume data having been

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adjusted is set to be equivalent to that of a sound volume of a system sound (error sound) generated by the operating system.

In another preferred construction, when voice data is transferred from an application for which sound volume setting information is yet to be registered, sound volume setting information based on a set sound volume is registered in the memory so as to correspond to the application.

In another preferred construction, a sound volume adjustment coefficient is stored as the sound volume setting information, the sound volume data is multiplied by the sound volume adjustment coefficient to generate the sound volume data having been adjusted, and when voice data is transferred from an application for which sound volume setting information is yet to be registered, sound volume setting information based on a set sound volume is registered in the memory so as to correspond to the application.

In another preferred construction, a sound volume level of the sound volume data having been adjusted is set to be equivalent to that of a sound volume of a system sound (error sound) generated by the operating system, and when voice data is transferred from an application for which sound volume setting information is yet to be registered, sound volume setting information based on a set sound volume is registered in

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the memory so as to correspond to the application.

In another preferred construction, a sound volume adjustment coefficient is stored as the sound volume setting information, the sound volume data is multiplied
5 by the sound volume adjustment coefficient to generate the sound volume data having been adjusted, a sound volume level of the sound volume data having been adjusted is set to be equivalent to that of a sound volume of a system sound (error sound) generated by the
10 operating system, and when voice data is transferred from an application for which sound volume setting information is yet to be registered, sound volume setting information based on a set sound volume is registered in the memory so as to correspond to the
15 application.

According to another aspect of the invention, a computer readable memory storing a sound volume adjustment program for controlling a personal computer to conduct sound volume adjustment,

20 the sound volume adjustment program comprising the steps of

registering sound volume setting information set for each application,

adjusting, for each application, sound volume
25 data of voice data transferred from the application to an operating system based on the sound volume setting information to generate sound volume data having been

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adjusted, and

transferring the sound volume data having been adjusted to the operating system.

Other objects, features and advantages of the present invention will become clear from the detailed description given herebelow.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be understood more fully from the detailed description given herebelow and from the accompanying drawings of the preferred embodiment of the invention, which, however, should not be taken to be limitative to the invention, but are for explanation and understanding only.

In the drawings:

Fig. 1 is a functional block diagram for use in explaining a structure of a personal computer according to one embodiment of the present invention;

Fig. 2 is a flow chart for use in explaining a personal computer sound volume adjustment method according to the present embodiment of the present invention;

Fig. 3 is a functional block diagram for use in explaining a structure of a conventional personal computer.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The preferred embodiment of the present invention will be discussed hereinafter in detail with reference to the accompanying drawings. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be obvious, however, to those skilled in the art that the present invention may be practiced without these specific details. In other instance, well-known structures are not shown in detail in order to unnecessary obscure the present invention.

It is assumed that the following personal computer sound volume adjustment processing according to the present embodiment is executed by a computer controlled by a program. The program is presented, for example, by a recording medium. Used as the recording medium may be, for example, a magnetic disk, a semiconductor memory or other arbitrary medium which can be read by a computer.

First with reference to Fig. 1, sound volume adjustment in a personal computer according to the present embodiment will be described. In the figure, illustration is made only of a part of the structure related to sound volume adjustment of the personal computer and that of the remaining part is omitted for the sake of explanation.

Fig. 1 is a functional block diagram for use in explaining the structure related to sound volume

adjustment of the personal computer according to the present embodiment. In the present embodiment, as well as the conventional art, voice data is transferred from each of a plurality of applications 120 and 121 to an operating system 100.

Also in the present embodiment similarly to the conventional art, the operating system 100 is provided with a volume adjustment function 110. The volume adjustment function 110 is realized, for example, as an analog volume.

Then, in the present embodiment, sound volume setting information set in advance for each application is registered in a memory 140. Here, a sound volume adjustment coefficient is stored as the sound volume setting information. The sound volume setting information is set such that a sound volume level of sound volume data having been adjusted is equivalent (e.g. the level is set to "1") to that of an error sound or the like generated by the operating system.

In a case, for example, of an application premised on that voice data is handled as an application of the personal computer, its sound volume data is originally set to have the same level of a sound volume as that of a warning sound of the personal computer. Therefore, stored as a sound volume adjustment coefficient corresponding to such an application is "1" indicating that the level is the same as the sound

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The sound volume adjustment control unit 130 displays sound volume adjustment function indications on an operation screen 150. When the application is yet to be registered, the sound volume adjustment control unit 130 displays the sound volume adjustment function indication on the operation screen 150. Then, through the user's operation of the sound volume adjustment function indication, sound volume setting information corresponding to a new application, that is, a sound volume adjustment coefficient, is set at the memory 140.

Fig. 2 is a flow chart for use in explaining a sound volume adjustment method of the present embodiment.

At the reproduction of voice data from an application at the personal computer, the application 120 or 121 requests the operating system 100 to open a sound device of the personal computer (Step 201).

In the present embodiment, the sound volume adjustment control unit 130 provided between the applications 120 and 121 and the operating system 100 hooks the request for open (Step 202). Then, the sound volume adjustment control unit 130 requests the operating system 100 to open the sound device (Step 203).

Subsequently, the sound volume adjustment control

unit 130 obtains a handle for the sound device from the operating system 100 (Step 204). Furthermore, the sound volume adjustment control unit 130 refers to the memory 140 to determine whether the application which has made a request for open is already registered or not (Step 205).

Then, if the application is already registered, the unit 130 obtains sound volume setting information corresponding to the application. Here, the unit obtains a sound volume adjustment coefficient (volume value) as the sound volume setting information (Step 206).

Next, the sound volume adjustment control unit 130 issues the handle for the sound device to the application (Step 207).

Then, the application issues PCM data as voice data to the operating system 100 (Step 208).

In the present embodiment, the sound adjustment control unit 130 hooks the PCM data (Step 209). Then, the sound volume adjustment control unit 130 adjusts the sound volume data of the PCM data. At the adjustment, the unit 130 multiplies the sound volume data by the sound volume adjustment coefficient obtained at Step 206 to generate sound volume data having been adjusted.

Subsequently, the sound volume adjustment control unit 130 issues the sound volume data having been adjusted to the operating system 100. As a result, the voice data is reproduced based on the sound volume data

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having been adjusted (Step 210).

On the other hand, when determination is made at the above Step 205 that the application is yet to be registered, the sound volume adjustment control unit 130 displays the sound volume adjustment function indication on the operation screen 150. Then, through the user's operation of the sound volume adjustment function indication, the sound volume setting information corresponding to a new application, that is, a sound volume adjustment coefficient, is set (Step 211).

Then, the new application and the new sound volume adjustment coefficient correlated to each other are registered in the memory 140 (Step 212).

These procedures enable automatic sound volume adjustment based on the registered sound volume setting information when voice data is transferred from the application again.

Although in the present embodiment described above, description has been made of an example where the present invention is structured under specific conditions, various modifications are possible. For example, in the above embodiment, although the present invention has been described with respect to a case where voice data is transferred from the two applications 120 and 121, the number of applications in the present invention is not limited thereto.

As described in detail in the foregoing, the

present invention enables automatic adjustment of sound volume data based on sound volume setting information registered including an application and a sound volume adjustment coefficient correlated to each other. As a result, simple sound volume adjustment operation realizes reproduction of voice data in a level sound volume appropriate for each application.

Although the invention has been illustrated and described with respect to exemplary embodiment thereof, it should be understood by those skilled in the art that the foregoing and various other changes, omissions and additions may be made therein and thereto, without departing from the spirit and scope of the present invention. Therefore, the present invention should not be understood as limited to the specific embodiment set out above but to include all possible embodiments which can be embodied within a scope encompassed and equivalents thereof with respect to the feature set out in the appended claims.

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